Studies on the Mosquito Fauna of Central Kerala with special reference to *Aedes albopictus*

(*S Y N O P S I S*)

The history of man is the history of his undaunted struggle against diseases. In fact, Haematophagous Arthropods and vector-borne diseases have proved to be a major deterrent in the progress of man towards a better life, particularly in tropical and subtropical countries. Arthropod-vectors took a heavier toll of human lives in the 17th through the early 20th centuries than all other causes put together. Mosquitoes are one of the most important Arthropod vectors that affect the well being of humans and domestic animals world-wide. They are undeniably more detrimental to human health than any other group of Arthropod vectors. Mosquito vectors transmit parasites responsible for diseases such as Malaria, Dengue fever, Chikungunya, Filariasis, Yellow fever, Kyasanur Forest Disease and various forms of Encephalitis such as Japanese Encephalitis, Eastern Equine Encephalitis, St Louis Encephalitis, Western Equine Encephalitis and Venezuelan Equine Encephalitis.

During the 19th and early part of 20th century these diseases caused an appallingly terrific human mortality, dealt a severe blow to the economic growth and overall developments of many countries of the world. However, most of these important mosquito-borne public health problems were effectively tackled and brought under control by the middle of the 20th century. The discovery and effective use of residual insecticides contributed substantially to this signal success. Unfortunately, the benefits of mosquito-borne disease control programme were short-lived. A number of mosquito-borne diseases began to re-emerge in the different parts of the world, including India in the 1970s. The resurgence has astonishingly intensified in the past 20 to 30 years. The recent emergence and resurgence of various mosquito-borne diseases have been a serious global health problem and have become more of a growing concern in India over the past few decades.

Though Kerala's health indicators are often said to be at par with those of developed countries, Kerala status of being the best health care system in India has fallen into disgrace in the past two decades due to the emergence/re-emergence of various mosquito-borne diseases such as Dengue Fever, Chikungunya, Japanese Encephalitis and Malaria. Among the various reasons, one chief cause of the outbreak of diseases was the complete absence of vector monitoring and subsequent lapses in the mosquito control

measures. Inadequate environmental sanitation, urbanization, unscientific agricultural practices, climatic conditions, etc provided situations congenial to mosquito proliferation.

The emergence and resurgence of various mosquito-borne diseases in Kerala necessitated a detailed study of mosquito fauna. It may also be noted that many species, although not carriers of any disease, can nevertheless be troublesome because of the serious biting nuisance they cause. Ironically, the diversity, distribution, ecology and population dynamics of many species of mosquitoes have not yet been adequately explored. Therefore, it is highly relevant and appropriate to investigate the mosquito fauna, especially of central Kerala which is considered as the epicentre of various mosquito-borne diseases. The present work has immense scope in the current scenario of the state. Sound knowledge and understanding of mosquito fauna is the foundation on which we can hope to control them and subsequently the mosquito - borne diseases.

The thesis is entitled "Studies on the Mosquito Fauna of Central Kerala with special reference to *Aedes albopictus"*. The objectives of the present study were the following:- (1) To understand the diversity, composition, distribution and breeding ecology of the mosquito fauna of central Kerala. (2) To study the breeding ecology and adult population dynamics of *Aedes albopictus* in rubber plantation belt of central Kerala. (3) To understand the Knowledge, Attitude and Practice (KAP) of people on *Aedes albopictus* and *Aedes albopictus* - borne diseases. The content of the thesis is divided itself into four chapters, each of which, except the first, contains subtitles such as introduction, review of literature, method and materials, observation, discussion and conclusion. Chapter wise synopsis of the thesis is given below.

The first chapter is the general introduction which delineates the background and significance of the study. The status of the mosquito-borne diseases such as Dengue fever, Chikungunya, Malaria, Filariasis and Japanese Encephalitis of Kerala with special reference to the study area is detailed in the chapter. Medical importance of mosquitoes is also highlighted in the chapter.

The second chapter concerns itself with the first objective of the research work - to understand the diversity, composition, distribution and breeding ecology of the mosquito fauna of central Kerala. The chapter begins with an introduction that describes the basic mosquito classification, general biology and morphology of mosquitoes. The literature pertaining to mosquito diversity at the national and state level is included under the title

review of literature. Standard methods of study were followed in the present research work. The design of study, details of study area, the selection of study sites, the standard collection techniques used in the study, etc are meticulously described in the methodology part of the chapter. The research work was designed as a three year study and each year was divided into three seasons. Samples were collected from each randomly selected locality, once in a season. Study area had a rich and diversified fauna of mosquitoes. Spatio-temporal variation was observed with regard to its distribution. Mosquitoes were found to exploit various breeding grounds. Observations are presented with various tables and suitable graphs wherever necessary. The data is analysed precisely using various statistical tools and the result of each objective is discussed in detail. Chapter one ends with a brief conclusion.

The recent episode of Dengue fever and Chikungunya outbreaks brought to light the importance of *Aedes albopictus* as primary vector in many parts of the world. As per the earlier mosquito survey reports, this species was totally absent or scanty in Kerala during 1980s. Within 20-30 years it spread throughout the state, causing serious threat to public health as vector of arboviruses. This species largely remained unnoticed till the emergence of arboviral diseases in Kerala. The present study of *Aedes albopictus* mosquitoes has arisen largely because of (1) the emergence of Aedes - borne diseases such as Dengue Fever and Chikungunya; (2) the incompleteness in our knowledge of ecology, distribution, population dynamics of *Aedes albopictus*; and (4) changes in the agricultural practices and ecology of the state. The third chapter address the second objective - to study the breeding ecology and adult population dynamics of *Aedes albopictus* in rubber plantation belt of central Kerala. The chapter starts with an introduction which is followed by review of literature. Classification, distribution, vector characteristic and various aspects of biology and ecology are detailed. The study was conducted by standard methods. The design of study, details of study area, sampling techniques used in the study, etc are described in the methodology part of the chapter. Observations regarding breeding habitat, larval indices and adult population dynamics are presented in suitable tabular and graphical forms. Larval indices like Container Index, House Index and Breteau Index were varied from season to season. *Aedes albopictus* showed seasonal population fluctuation. Rainfall was found to influence the ecology and population dynamics of *Aedes albopictu*. The data is analysed using suitable statistical tools and results are disused with prevailing knowledge. The chapter ends with a comprehensive conclusion.

For the successful prevention and control of any vector-borne disease, the most important prerequisite is community participation. Prevention of disease through better education, knowledge, socio-economic conditions and practice is the best way to ward off disease and remain healthy. Ignorance and impoverished conditions in which people live contribute to the breeding of mosquitoes, spread of diseases and hinder disease control strategy. So the Knowledge, Attitude and Practice (KAP) of community should be analysed before the implementation of a control programme. Deficiency, if any should be compensated through proper awareness campaign. Prevention and control became more effective when community has proper knowledge, attitude and practice regarding disease and vector. KAP study measures the Knowledge, Attitude and Practices of a community. In the present study a sincere attempt has been made to understand the Knowledge, Attitude and Practice regarding *Aedes albopictus* mosquito and *Aedes albopictus* -borne diseases among adult population of the study area. The introductory part includes the significance of KAP study and detailed etiology of Chikungunya and Dengue Fever. Review part contains details of KAP studies conducted at international and national level regarding this topic. Methodology part of the chapter gives details regarding design of study, study area, sampling techniques, research tool, etc. The mode of study was survey. Survey was based on self-prepared questionnaire consisting of thirty questions which were intended to collect data regarding basic socio-economic-demographic profile of respondents; knowledge regarding Chikungunya, Dengue Fever, vector characteristics; and attitude and practice towards disease prevention, source reduction, etc. The collected data is presented in suitable tables and graphs for better comprehension. The collected data was analysed by means of suitable statistical tools. It was found that high level of knowledge of respondents was not translated into a good practice. The findings are properly discussed and the chapter ends with a conclusion.

References used throughout the thesis are arranged in alphabetic order in the bibliography section.

The guidelines of University are followed in the preparation of the thesis. Title, Declaration, Certificate, Acknowledgement, Abstract, Preface, Table of Contents, List of Tables, List of Figures, List of Abbreviations, Content of Chapters, Bibliography, Index and Appendix are arranged in the thesis as per the guidelines.